

IN THE CLAIMS

1. (Original) A piezoelectric actuator, comprising:

a plurality of piezoelectric layers each of which is formed of a piezoelectric material;

a plurality of electrode layers which are stacked alternately with the piezoelectric layers; and

at least one active portion which is provided by respective portions of the piezoelectric layers, such that each of said respective portions is sandwiched by corresponding two electrode layers of the plurality of electrode layers, said corresponding two electrode layers being opposed to each other in a direction of the alternate stacking of the piezoelectric layers and the electrode layers, said at least one active portion being deformed when an electric voltage is applied to the plurality of electrode layers,

the piezoelectric layers including at least one first piezoelectric layer having a first thickness, and at least one second piezoelectric layer having a second thickness greater than the first thickness.

2. (Original) The piezoelectric actuator according to claim 1, wherein the piezoelectric actuator is fixed to an object which utilizes the deformation of said at least one active portion of the piezoelectric actuator, such that said at least one second piezoelectric layer is remoter from the object than said at least one first piezoelectric layer.

3. (Original) The piezoelectric actuator according to claim 1, wherein said at least one first piezoelectric layer comprises a first number of first piezoelectric sheet or sheets, and said at least one second piezoelectric layer comprises a second number of second piezoelectric sheets, the second number being greater than the first number.

4. (Original) The piezoelectric actuator according to claim 3, wherein the first piezoelectric sheet has a same thickness as a thickness of each of the second piezoelectric sheets.

5. (Original) The piezoelectric actuator according to claim 4, wherein the same thickness of each of the first and second piezoelectric sheets falls in a range of from 10 μ m to 150 μ m.

6. (Original) The piezoelectric actuator according to claim 1, wherein said at least one first piezoelectric layer comprises a single first piezoelectric sheet having the first thickness, and said at least one second piezoelectric layer comprises a single second piezoelectric sheet having the second thickness.

7. (Original) The piezoelectric actuator according to claim 6, wherein the second thickness is greater, by not less than 50 %, than the first thickness.

8. (Original) The piezoelectric actuator according to claim 1, wherein the piezoelectric layers include a first number of said first piezoelectric layers, and a second number of said second piezoelectric layer or layers, the second number being not greater than half a sum of the first number and the second number.

9. (Original) The piezoelectric actuator according to claim 1, comprising a plurality of said active portions, wherein the actuator is fixed to a cavity unit having a plurality of ink chambers, such that the active portions are aligned with the ink chambers, respectively, so as to provide an ink jet printer head, and wherein one of said corresponding two electrode layers of the actuator is an individual-electrode layer including a plurality of individual electrodes corresponding to the ink chambers, respectively, and the other of said corresponding two electrode layers of the actuator is a common electrode which is common to the ink chambers, the individual electrodes cooperating with the common electrode to sandwich a plurality of portions of each of the piezoelectric layers to provide the active portions, respectively, each of which is deformed to change a volume of a corresponding one of the ink chambers.

10. (Original) The piezoelectric actuator according to claim 1, wherein the plurality of piezoelectric layers include a plurality of said first piezoelectric layers and said at least one second piezoelectric layer.

11. (Original) The piezoelectric actuator according to claim 1, further comprising at least one restrictive layer fixed to the alternately stacked piezoelectric layers and electrode layers, said at least one restrictive layer restricting the deformation of said at least one active portion in the piezoelectric layers.

12. (Original) An ink jet printer head, comprising:

a cavity unit having a plurality of ink chambers each of which accommodates an ink, and additionally having a plurality of nozzles which communicate with the ink chambers, respectively, and eject a droplet of the ink toward a recording medium; and

a piezoelectric actuator which is fixed to the cavity unit, the piezoelectric actuator including

a plurality of piezoelectric layers each of which is formed of a piezoelectric material and which include at least one first piezoelectric layer having a first thickness, and additionally include at least one second piezoelectric layer having a second thickness greater than the first thickness;

a plurality of electrode layers which are stacked alternately with the piezoelectric layers; and

a plurality of active portions which are aligned with the ink chambers of the cavity unit, respectively, and each of which is provided by respective portions of the piezoelectric layers, such that each of said respective portions is sandwiched by corresponding two electrode layers of the plurality of electrode layers, said corresponding two electrode layers being opposed to each other in a direction of the alternate stacking of the piezoelectric layers and the electrode layers, said each active portion being deformed to change a volume of a corresponding one of the ink chambers, when an electric voltage is applied to the plurality of electrode layers.

13. (Original) The ink jet printer head according to claim 12, wherein said at least one second piezoelectric layer is remoter from the cavity unit than said at least one first piezoelectric layer.

14. (Original) The ink jet printer head according to claim 12, wherein one of said corresponding two electrode layers of the piezoelectric actuator is an individual-electrode layer including a plurality of individual electrodes corresponding to the ink chambers of the cavity unit, respectively, and the other of said corresponding two electrode layers is a common electrode which is common to the ink chambers, the individual electrodes cooperating with the common electrode to sandwich a plurality of portions of each of the piezoelectric layers to provide the active portions, respectively.

15. (Original) The ink jet printer head according to claim 12, wherein the plurality of piezoelectric layers of the piezoelectric actuator include a plurality of said first piezoelectric layers and said at least one second piezoelectric layer.

16. (New) The piezoelectric actuator according to claim 1, wherein the plurality of electrodes layers comprise at least three electrode layers including a first pair of electrode layers which cooperate with each other to sandwich said at least one first piezoelectric layer, and a second pair of electrode layers which cooperate with each other to sandwich said at least one second piezoelectric layer.

17. (New) The ink jet printer head according to claim 12, wherein the plurality of electrode layers comprise at least three electrode layers including a first pair of electrode layers which cooperate with each other to sandwich said at least one first piezoelectric layer, and a second pair of electrode layers which cooperate with each other to sandwich said at least one second piezoelectric layer.